the operations. These have been amenable to excision and injections, which have been followed by healthy cicatrization.

There is at present no disposition in the disease to extend, but, on the contrary, a marked tendency toward further progressive diminution and shrinking in those parts where the level of the original surface is not attained.

The portions of the diseased mass which were excised, exhibited pathological changes of a marked character, as was at first diagnosticated. The tissues principally involved in the disease were the dermoid, the subcutaneous adipo-cellular layer, and the vascular. On the face, where the tubercular character of the disease was most manifest, the skin was covered with cuticle in the form of slight squamæ, under which the corion assumed a reddish tint. Numerous white specks were disseminated over the irregular surface, and these appeared to be the augmented secretion from the enlarged sebaceous follicles. The dermoid tissue proper was not much thickened on the nipple-like projections; the subcutaneous layer of cellular tissue was hypertrophied, and the mesh-work expanded and infiltrated with oily serum and lymph; the vascular tissues, arteries, and veins, ramifying through this morbid structure, were abnormally developed and active; finally, the tubercular elevations were formed principally from the adipo-cellular layer thus transformed.

The portion of the diseased structure excised from the neck under the jaw, was entirely different in character. The surface here was leaden, scaly, rough, and hard, and the skin thickened as in elephantiasis arabum. The cellular tissue was much hypertrophied, dense, infiltrated, and vascular. In some parts the arteries and veins were so developed as to assume the character of what is termed by Cruveilhier accidental erectile tissue—"*tissu erectile accidentel.*" The microscope revealed nothing of importance.

The functions of the brain are performed as well as at any period of her life. The memory is not in the slightest degree impaired, and the other faculties of the mind are equally undisturbed. In fact, there has been no alteration mentally from the operations on the common carotids.

NEW YORK, March 2d, 1867.

ART. XII.—*Successful Removal of a Fibro-plastic Tumour from the Body of the Right Vocal Cord, with the Aid of the Laryngoscope.* By HENRY K. OLIVER, M. D., Boston.

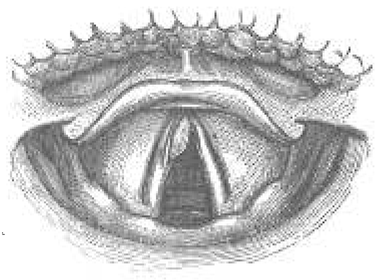
MR. H., an intelligent mechanic, and an amateur singer, aged forty-six years, came to me on the 25th of May, 1866, on account of an obscure affection of the larynx. He was accompanied by his physician, Dr. Geo. B. Coggswell, of North Easton, Mass. The history of his case is as follows:—

Mr. H. had always enjoyed good general health, and, previous to the existing difficulty, had never had any trouble with his throat worth mentioning. Some time in the spring of 1865, he noticed a slight hoarseness in singing—affecting particularly the upper notes—which at times was scarcely perceptible. This hoarseness gradually increased, until, in the early part of August, the natural voice disappeared, and a high unnatural tone took its place, and had continued. There had been no soreness or pain in the larynx, no difficulty of breathing or of swallowing, and his previous good general health had continued. Since the commencement of the difficulty he had been under medical treatment, but had never been examined with the laryngoscope. Careful inquiry removed all suspicion of the existence of syphilis.

On making pressure over the larynx, neither pain nor soreness was experienced, nor was anything abnormal seen in the fauces. In speaking, the tone was of a high, weak, falsetto character, and every effort to produce the natural voice was unavailing.

On examination with the laryngoscope, a tumour was seen upon the right vocal cord, occupying, by a broad base, quite one-third of its length, commencing well up to its anterior origin. In size and shape the growth resembled the third part of a very large pea, flattened from above downwards. Its colour was pinkish-white, and its surface somewhat irregular, but smooth and shining. A more careful examination of its base showed that the growth had its origin in the deeper tissue of the cord, the superior surface of which bulged considerably upwards. From the amount of this distortion, I judged that more than one-half the length of the cord was implicated. The tumour, in its development, seemed to have forced its way through immediately below the free edge of the cord which ran, in a thin lip, over its upper surface.

Fig. 1.



The annexed engraving, Fig. 1, is a faithful representation of the neoplasm as it appeared at the first examination.

On an attempt at phonation, both vocal cords moved, with equal promptness, to the middle line, and the arytænoid cartilages came into close apposition. When the glottis was closed, the tumour pressed into the left cord just below its free edge, which was drawn up over the surface of the growth to a considerable extent. A similar, though much more limited movement of the free edge of the affected cord was also observed, so that a large part of the tumour was concealed from view. The only aperture available in phonation was, therefore, a short narrow opening extending from the posterior surface of the tumour to the vocal processes; as the cartilaginous glottis was manifestly closed.

Attention being subsequently directed to that portion of the sound cord which, in the closure of the glottis, met the apex of the tumour, it was observed that a permanent indentation existed there. This indentation will be found represented in the engraving.

Besides the neoplasm, nothing abnormal was noticed in the larynx, excepting a slightly congested appearance of the affected cord.

At this first examination the growth was shown to Dr. Coggswell, and to Dr. R. M. Hodges, also, who happened then to call at my office.

With regard to the nature of the growth, judging from its external characteristics and its deep origin, it was, apparently, fibroid, but of this I could not feel, at the moment, quité confident.

It will be seen that, in this case, I had to do with a neoplasm which presented unusual obstacles to a successful extirpation. Success, in the broadest sense of that word, in the removal of sessile growths upon the vocal cords, is by no means easy of attainment; for it must be borne in mind that the inviolability of the cords, upon which depends the restoration of the voice, is second only in importance to the removal of the tumour. In this case, however, there was not merely a broad-based growth, but the base was buried in the substance of the cord, and, moreover, its seat was in the anterior portion of the cord, where, on account of the epiglottis, manipulation in the larynx is often so difficult. On the other hand, I had in my favour a throat which bore the presence of the laryngoscope well, and was of good capacity; an epiglottis which was in a sufficiently upright position, and, what was of no less moment, a willing and an intelligent patient.

As to any decision upon the method of operating, that was, for the time being, held in abeyance until I had become satisfied as to the density of the neoplasm. I therefore contented myself, at the first visit, with endeavouring to determine the length which it would be necessary to give the descending branch of whatever instrument I should employ, and the angle which it should make with the horizontal branch. For this purpose, I passed the ordinary laryngeal silver probe, at various angles and lengths, into the larynx, until I had determined the points desired, and, as proof that the measurements were correct, I melted a small bead of nitrate of silver upon the extremity of the probe, and touched the upper surface of the tumour lightly, leaving a white mark upon it.

Pending further proceedings, I dispatched the patient to his home, with instructions to pass a curved bougie down towards the opening of the larynx, several times a day.

Thinking that, whatever consistence the growth might prove to possess, I might be able to crush its free portion, and possibly break up its attachment, with forceps of suitable construction, I had such an instrument made, nothing that I possessed seeming likely to answer the purpose.[1] With

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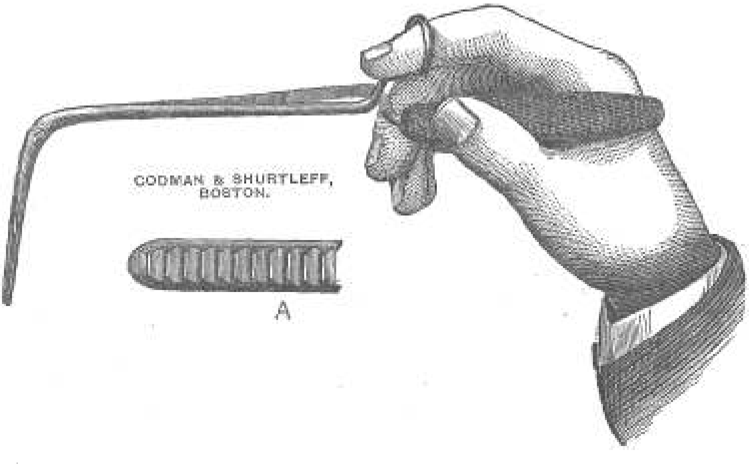
[1] I annex an engraving, Fig. 2, and a short description of this instrument. It was manufactured by Messrs. Codman and Shurtleff, of Boston, according to a design furnished by me. I am only persuaded to add to the already large list of laryngeal instruments, because several laryngoscopists have voluntarily expressed a

Fig. 2.



this forceps I endeavored, on June 3d, to grasp the tumour, but the space between it and the anterior angle of the cords was not sufficient to allow the blade of the forceps to be inserted, and the attempt was abandoned. I then decided to destroy the growth by caustics. Previously, however, I made a thorough tactile examination of the tumour, in order to determine its consistency, employing again the silver probe, with which I touched every part of its visible surface. The result convinced me that the growth was exceedingly dense in structure. I could not, indeed, produce any impression upon it, the probe glancing off when firm pressure was made. I convinced myself, however, of one fact which promised to aid me materially in the treatment, which was, that pressure upon the tumour itself was well tolerated, provided that no part of the instrument came into contact with the epiglottis, or with the walls of the larynx.

On the 9th of June, I made the first application of caustic, employing the solid nitrate of silver.[1] The point chosen was the centre of the tumour, as near to the edge of the vocal cord as I deemed prudent. My plan was to eat out, by means of the caustic, a cavity in the central portion of the growth, into which I should be able to introduce, safely, a sufficient quantity of caustic to destroy the base, the destruction of which would, of course, imply that of the free portion of the growth.

favourable opinion of this pattern. It is only intended for the crushing of large, or medium-sized growths situated upon the border of the vocal cords, or such as, growing from the ventricles of the larynx, or from the ventricular bands, project towards the median line of the glottis. Ordinarily, in the attempt to seize a tumour, whether successful or not, the closure of the larynx follows, and compels the withdrawal of the instrument. The forceps I have designed, is intended for use when the glottis is closed, so that what is generally considered an accident, (to be, if possible, avoided), is, with this instrument, a thing to be encouraged.

As will be seen by reference to the engraving, the instrument is, essentially, an ordinary laryngeal forceps, opening antero-posteriorly. The blades are, however, longer and narrower, and have a considerable bevel on the toothed edges (see portion of blade enlarged at A), so that in the closure of the blades between two opposing surfaces, like the vocal cords in their approximation, these surfaces are in no danger of being implicated, while the force is exerted upon any growth, which, in the closure of the larynx, is thrust between the blades. Cases will doubtless occur, now and then, in which, from an unusually sensitive condition of the larynx, the operator will find it difficult to seize a growth upon the border of the vocal cords, or of the ventricular bands, by means of forceps with short blades. In such cases, the instrument described will, I am confident, serve a useful purpose. The mechanism of the handle is recommended as preferable to the ordinary handles, with rings for finger and thumb, the use of which requires the elbow to be raised to a degree both awkward and uncomfortable.

[1] The porte-caustique which I commonly use is the ordinary silver bulb-pointed laryngeal probe, which is, by many operators, esteemed more highly than any other. My instrument is made of rather stouter wire than usual, and with a correspondingly larger bulb, which, instead of being solid, is hollowed out with a cup-like cavity, the mouth of which is of a diameter somewhat less than the external diameter of the bulb. At the fundus of the cavity two fine holes pass obliquely to the exterior. In the use of the nitrate of silver, a small bead of the salt is melted over the mouth of the cavity. When any other caustic is employed,

On the 13th, no effect of the nitrate of silver being noticed, I charged the porte-caustique with Vienna paste, by sprinkling the powder over the moistened surface of the sponge, and this I applied to the tumour at the point before mentioned, keeping it in contact with the surface as long as was possible. This application of the paste I repeated semi-weekly (with the exception of an occasional use of the nitrate of silver), until July 30, the only effect being to produce a slightly worm-eaten appearance at the part touched; while the main portion, manifestly stimulated by the caustic, had taken on an increased growth, and that to such a degree as to separate the cords perceptibly, so that the patient could not speak even in the former high tone, but only in whisper. The failure to produce any considerable effect upon the tumour arose from the fact, that on no occasion was I able to make anything more than a superficial application of the caustic, inasmuch as any firm pressure upon the surface of the tumour was prevented by its hard and smooth character. Attempts to make the desired amount of pressure were invariably followed by the glancing off of the instrument. I had persisted in the applications under the constant hope and belief that each one would be followed by some perceptible effect, and because I preferred to be over-cautious, on account of the danger there seemed to be of injury to the vocal cord by a free use of the caustic.

In anticipation of the failure of the caustic to accomplish, unaided, the destruction of the neoplasm, I had provided myself with an uncovered, double-edged, and sharp-pointed laryngeal knife, having a slender but strong stock, and with the length of the descending branch and its angle of curvature suited to this particular case.[1]

With this knife, therefore, on July 30, I made a superficial incision into the tumour, from front to back, parallel with the cord, and as near as possible to its edge. It cut like a dense fibroid mass; some blood followed the cutting, and some pain was complained of. After the withdrawal of the knife, I rubbed solid nitrate of silver into the incision.

On the 4th of August, there was a gangrenous appearance in the line of the incision of July 30, but the destructive effect was quite limited. I therefore made several gashes in the same line, and applied a solution of caustic potash of moderate strength. As the incised wound was narrow, I laid aside the porte-caustique which I had been employing, and used, on this and on all subsequent occasions, a simple silver wire, without the bulbous extremity. To the extremity of this I attached, firmly, a bit of

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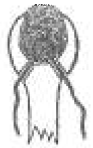
a bit of sponge is strung upon a piece of silk thread, the extremities of which are passed through the openings in the fundus of the cavity. The sponge is then to be pulled into the cavity, and, after the ends of the thread are securely tied exteriorly, is to be trimmed so as to project but slightly.

Fig. 3.



The annexed cut, Fig. 3, represents an enlarged section of the extremity of this instrument.

With this contrivance, any caustic, either in powder, or in solution, is easily and safely conveyed to the larynx. The excess of the external diameter of the bulb over the diameter of the mouth of the cavity affords, practically, to the laryngeal walls, sufficient protection from the caustic, both in the passage of the instrument into the larynx, and in its withdrawal after cauterization.

[1] This angle was 95°, and the length of the descending branch, from a line continuous with the horizontal branch, 3¾ inches to the point of the knife.

sponge. I had no hesitation in employing the caustic uncovered, as I had little difficulty in conveying the probe into the larynx, and I designed exhausting the sponge of the caustic in the wound.

The incising and the application caused considerable pain, which shot up into the right ear, and occasionally into the left, so that the patient could not resist thrusting his finger firmly into each meatus. There had been the same shooting of pain to the ear at the previous use of the lancet, and on one or two occasions also when the caustic was used without the lancet.[1]

Desiring to follow up the operations of the 4th, I advised the patient to remain in the city for a day or two; and, on the 5th, I made another deeper series of gashes, and applied again the solution of potash. The operation of the preceding day had given a dark, pulpy look to the line of the incisions. The patient reported that the bleeding from the wound had continued a number of hours after leaving my office.

On the 6th, I repeated the incisions, and applied strong nitric acid. Moderate spasm followed the application. The patient then returned to his home, reporting to me again on the 10th. On examination there was a decided boggy furrow where the incisions had been made, while, from its posterior extremity, small gangrenous shreds were seen hanging down. The greater part of the surface of the growth had also a grayish look. At this date I made additional incisions, turning the instrument, as much as was possible, so as to cut into the base of the tumour, and applied nitric acid.

On the 13th, the furrow was considerably wider and deeper, but the base did not appear to yield, and I therefore at this date, and again on the 17th, cut still deeper into the growth, hacking the base as well as I could, and applied, on each occasion, a stronger solution of potash than I had before used.

On the 20th, Mr. H. reported himself, speaking in a natural tone of voice for the first time in twelve months. The voice was, however, of only moderate strength. On examining the larynx, I found that the tumour was separated from its base for the greater part of its length, and was attached to its anterior portion by a short pedicle. The body of the growth was ragged and gangrenous, and had a greater vertical diameter than I had expected. In phonation the polyp was lifted up above the level of the cords by their approximation. The restoration of the voice was therefore easily accounted for. At this visit, after scarifying the base of the growth, I applied the solution of potash.

On the 24th, while scarifying in the vicinity of the attachment of the polyp, the patient gagged, and immediately afterwards complained of some obstruction in the larynx. On examination I found that the polyp had been separated from its attachment, but was not to be seen; and although I made as thorough a search as was practicable with the patient's uncontrollable efforts to relieve himself therefrom, I was unsuccessful in determining its locality. Finally, the polyp not coming to light, I instructed him to lie upon the couch, with his head and chest hanging over the edge, and to cough with some force. After two or three efforts, he spat the polyp into his hand. Immediate relief followed its expulsion, and, after a few moments' rest, I applied nitric acid to the base of the growth.

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[1] The nerve involved in the acknowledged sympathetic connection between the auditory canal and the larynx, is, according to Romberg and Toynbee, the auricular branch of the vagus. Dr. C. B. Fox, however (London Lancet, April 28, 1866), thinks that this branch of the vagus is not distributed to the meatus, but to the posterior part of the pinna, and that the nerves really concerned are the branches of the auriculo-temporal of the fifth cranial nerve, on the one hand, and the vagus on the other, the deep origin of the sensitive root of the former being in close proximity to the deep origin of the vagus in the floor of the fourth ventricle.

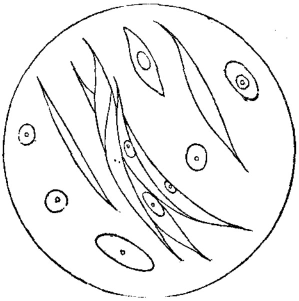
I can give no information with regard to the place of lodgement of the polyp. I feel quite positive, however, from the character of the patient's efforts to expel it, that it was lodged either in the larynx itself, or in the air-passages below.

The polyp, after having been some months in alcohol, is of a flattened oval form, being four lines in length, three lines in breadth, and two lines in thickness. Dr. Calvin Ellis, to whom I submitted it for examination immediately after its removal, favoured me, shortly after, with the following report:—

> "The small growth removed from the larynx of Mr. H. was of considerable consistence, and only with difficulty divided by the dissecting needle, or crushed. A microscopic examination showed some fibres, and many nuclei and cells described as fibro-plastic."

The annexed engraving, Fig. 4, is copied from a drawing by Dr. Ellis, of the microscopic appearances.

Fig. 4.



X 382.

On the 27th, I found the sound vocal cord considerably inflamed, from the application made on the 24th, the removal of the polyp permitting this cord to come into contact with the caustic upon the base of the growth. On account of this inflammation no application was made at this visit.

On the 31st the inflammatory condition had disappeared. The base of the growth had a gangrenous appearance, but I could not satisfy myself that the treatment had, latterly, induced more than a superficial destruction. In fact, the main body seemed to have increased in bulk. After scarification, therefore, I applied the acid nitrate of mercury. The application caused considerable smarting, more so than any of the former caustics, but the spasm was slight and came on gradually.

On September 3d, the patient announced that the application at the previous visit, although causing, as above reported, very little spasm at the time, induced quite a severe one half an hour after leaving my office. An examination of the larynx revealed the unpleasant fact that the tumour was starting out again in spite of the treatment. I however scarified, and applied nitric acid.

At his next visit, on the 7th, the patient again spoke in the original high tone of voice. He could, however, speak in the natural voice by choosing a very low pitch. I now found that the tumour was nearly as large as when I first saw it. In fact, the portion in the cord was considerably more bulky than at first. Its growth had been surprisingly rapid during the previous seven days. In the closure of the glottis the apex was buried in the opposite cord, as before, though not so deeply, so that in a forced attempt to produce a low tone, the cord, in vibrating, swung clear of the growth.

The condition of things was certainly not encouraging, for it was evident that a much more energetic method of treatment, which, of course, implied a greater risk to the integrity of the cord, must be substituted for the cautious method I had adopted. The latter had been successful in the removal of the free portion of the tumour, but had not made headway against the growth of the buried portion, stimulated as it had been by the action of the knife and the caustic.[1]

I therefore, at this visit, prepared to make the attempt to destroy the growth at a blow. With this design I made incisions into the tumour close to the edge of the cord, as at previous operations, but much deeper, so that the wound gaped perceptibly; and then rubbed in a saturated solution of chromic acid, having also on the sponge a small quantity of the acid in powder. I made an attempt also to insert the lancet into the buried portion of the tumour at some little distance from the edge of the cord, for the purpose of determining the possibility of safely introducing there a small quantity of caustic. But I found it impossible to insert the point without the exercise of more force than I deemed prudent. Pretty severe pain accompanied the incising, shooting up into the ears as before described. There was, however, less smarting from the caustic, and no spasm at the time.

On the 10th, the patient made his appearance, speaking again in the natural tone of voice. He reported having had a pretty severe spasm in the cars, three-quarters of an hour after leaving me. There had been also a good deal of soreness in the larynx since the last operation. An examination showed that the upper half of the free portion of the tumour had been destroyed; but the destructive effect of the acid, even upon the free portion, was not as great as I had hoped for and expected, while the base was comparatively unharmed. Approximation of the cords was, however, seen to be possible, and the vibrations of the sound cord were only to a limited degree interfered with by the undestroyed portion of the growth beneath it.[2]

The failure of the chromic acid to destroy the growth left me somewhat at a loss what caustic next to select. That class of caustics the action of which upon the living tissues is limited, had been faithfully tried. Even potash, a substance the effect of which it is notoriously difficult to limit, had, in solution, failed seriously to affect the neoplasm; so that I was finally convinced that the entire removal of the tumour could not be accomplished without taking a risk of injury to the cord.

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[1] Cauterization in the larynx is accomplished at a manifest disadvantage, on account of the sensitiveness and mobility of the parts; and on account, also, of the fact that the quantity of caustic employed must be limited. It is, therefore, not to be wondered at, that in such neoplasms in this organ as can, from their locality, or other causes, only be cauterized in a superficial manner, an increase, rather than a decrease of their tissue is observed, such being a common result of superficial cauterization of morbid growths in other parts of the body.

[2] It is well known to observers on the physiology of the larynx that the cords arch upwards in phonation. This fact will explain the possibility of vibratory action in this instance.

I then selected caustic potash in powder as the substance to be next employed, hoping, by the exercise of special care, to confine its action to the limits of the morbid growth.

Having, therefore, laid open the wound of the last operation, and added fresh incisions so that it gaped more widely than ever, I rolled the extremity of the moistened sponge in freshly-powdered caustic potash, and, conveying it to the tumour, rubbed it with extreme care into the wound; and the same operation I repeated with fresh caustic. There was no spasm, and the patient left soon after for his home.

On the 17th, the date of his next visit, Mr. H.'s voice was still further improved, a fact that relieved me of a good measure of the anxiety I had had concerning the probable effect of the potash. He reported that he had had much soreness in the larynx, and that the breath had been quite offensive. He had also spat up, on the 13th, two or three bits of what seemed to be "dead flesh," which tasted offensively. On examination, I found, to my delight, that the entire growth appeared to have been destroyed, and that the vocal cord was quite uninjured. The free portion was certainly swept away, and a considerable excavation in the cord, where the base of the growth had existed, led me to hope that that portion also had at last yielded. Whether this were really so or not, I could not yet determine with certainty, as the cavity was lined with a greenish looking layer. There were, moreover, to be noticed, upon the inferior edge of the cavity, two small nodules which seemed to be remnants of the neoplasm. The breath was still somewhat offensive, and as the completeness of the destruction could not be determined with certainty until the cavity was cleared of its gangrenous layer, the patient returned home. As for the nodules, if they were portions of the original tumour, they were evidently isolated, and, separated thus from the support of the main growth, I hoped for their gradual disappearance.

On the 27th, the patient visited me again, when the edges of the cavity appeared to be contracting, though its gangrenous look had not yet disappeared.

After this date I saw him only occasionally, nothing being done except to watch the progress of the case. The result was that the cavity became healthy looking, gradually filled up and contracted, and the nodules diminished in size. The voice became stronger, so that on his visit to me on the 17th of November, he reported that he had been able to resume his duties in the church choir.

My last examination of the larynx was on March 23, 1867, six and a half months after the final operation, at which date also I presented the patient to the notice of the Suffolk District Medical Society, at their monthly meeting, and read a report of the case.[1] At this examination the cicatrix presented the form of an elongated ellipse, somewhat depressed below the level of the border of the cord, the sides being formed by the lips which originally passed above and below it, their outlines being still visible. The right cord was, throughout its entire length, somewhat thickened, and the colour was slightly deeper than normal. The nodules had, apparently, quite disappeared.

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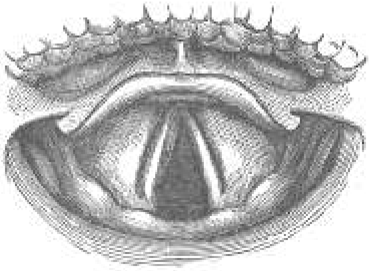
[1] In a letter received from Mr. H., dated May 16, 1867, eight months after the final operation, he says, "My voice remains as good as when you last saw me, and, I think, is even a little better."

The annexed engraving, Fig. 5, gives a good representation of the appearances just described.

Fig. 5.



In the approximation of the cords, the cicatrix was seen to be quite pliable, so that in the production of the lower tones the internal border of the right cord preserved a regular outline. When, on the other hand, the tension of the cords was increased in the production of the higher tones, the border was, at the locality of the cicatrix, somewhat, though slightly, irregular. Either, however, from the presence of the cicatrix, or from the hypertrophied condition of the cord, its vibratory action was materially embarrassed, and, indeed, I was inclined to doubt if there were any such action at all, at least in the middle and upper tones.

The voice in speaking was very good, and it is doubtful if any one would have suspected that it had ever been seriously affected. Indeed Mr. H. affirmed that his own family found only a slight change from his former voice. In singing, also, he stated that he found the change to be not a very great one, except that there was some loss of power, and that the higher tones were rather hard and unsympathetic, so that he thought he should be obliged to discontinue the use of his tenor voice, and substitute baritone.

The result of this case can be justly considered satisfactory, when the circumstances of the nature of the growth, its locality, and its deep origin are taken into account. I am aware that the time occupied in the removal of the neoplasm might have been shortened; but, on account of its position in the cord, and my doubts as to its probable capacity of resistance to caustic action, I chose to err on the safe side, rather than risk, unnecessarily, the safety of the cord. Expenditure of time, in such cases, is matter of little moment compared with restoration of the vocal functions. The time might have been shortened had the patient been able to remain in the city, or to have visited me more frequently.

The chief points of interest in this case are the following:—

1. The nature of the neoplasm, which, according to Dr. Ellis, was fibroplastic, a species of growth quite rare in the larynx.

2. Its deep origin. This circumstance is also rare. The ordinary fibrous polypi in the larynx take their rise, for the most part, in the submucous areolar tissue. That the growth in this case had a deeper source was apparent at the first, from the laryngoscopal appearances alone. This would seem to have received confirmation subsequently by the examination, on the 7th of September, with the point of the lancet at some distance from the free edge of the cord, and from the depth of the cavity observed after the application of the caustic which insured the destruction of the neoplasm, although it is, of course, possible that the healthy tissues may have been implicated to a limited degree in the destructive effect. What

the tissue was which was the seat of the growth, it is not possible to say with certainty. It may have been the fibrous portion of the vocal cord (*membrana vocalis*); but my belief is, that it had a still deeper source, namely, in the vocal muscle itself (the horizontal fibres of the thyro-arytænoid muscle).[1]

3. Its power of resistance to the action of caustics. This seemed to me to be quite remarkable. It was not to be wondered at that its tissue did not give way under the earlier applications, unaided by the knife; but that it should not only resist, stubbornly, the combined agencies of the knife and the stronger acids, &c., but should even increase rapidly during their employment, is certainly noticeable. The superficial cauterization of morbid growths often induces, as has already been said, their more rapid development; at the same time, I cannot but think that none of the ordinary neoplasms of the larynx would so obstinately have resisted treatment.

4. The fact that, notwithstanding the unyielding character of the neoplasm, its substance finally gave way without, as far as is known, any of the surrounding healthy tissues being implicated in the destructive action. This was, perhaps, partly owing to my care in depositing the powdered potash.

With regard to the possibility of the recurrence of this tumour, there is, undoubtedly, some reason for apprehension; such being the tendency often manifested by growths described as fibro-plastic—or sarcomatous of some pathologists—in other parts of the body. The ordinary fibrous polypi of the larynx show no tendency to recur.

The means of illumination employed throughout the case was reflected artificial light, from an argand gas-burner, furnished with a single lens-light concentrator. Other accessories, such as head-rest, &c., were not used. The patient sat in an ordinary chair, holding the protruded tongue with the fingers of the right hand. I had at no time any other assistance in operating. The daily use of the bougie by the patient himself, for the purpose of diminishing the sensibility of the larynx, was continued throughout the treatment. Insensibility, however, was never attained to such a degree as to permit contact of the instruments with the epiglottis, or the sides of the larynx, without inducing closure of the organ.

It is happily no longer necessary, as formerly, to substantiate the fact of the presence of a neoplasm in the larynx in any particular instance, and of its actual removal by operative means through the natural passages; but, in passing, I may remark that, in addition to Drs. Coggswell and Hodges, the larynx was exhibited, at various stages of the treatment, to Drs. Warren, Cabot, Bowditch and Langmaid.

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[1] "Sarcomatous tumours affect the areolar tissues, the fibrous membranes—especially the submucous—the muscles, inter-muscular tissue, * * *."—ROKITANSKY.

In conclusion, it may not be out of place, on account of their interest in a physiological point of view, to call to mind some of the vocal phenomena which manifested themselves, from time to time, in the progress of the case.

The loss of the natural voice was owing, of course, to a purely mechanical cause. The vibratory action of one cord was prevented by the tumour, and that of the other by the pressure of the apex of the tumour acting thereon like a damper. When the tumour was converted into a polyp, the impediment to the vibration of the left cord was removed, and, although the base of the growth still remained as an obstruction to the normal action of the right cord, the voice was nevertheless restored.[1]

At the commencement of the reproduction of the tumour, subsequent to the removal of the polyp, it was noticed that the higher tones of the scale were lost, while the lower were still available. Even when the tumour had acquired almost its original dimensions, it was possible for the patient to produce a low tone. These results were owing, as the laryngeal mirror showed, to the fact that the vocal cords were less tense in the production of the low, than in that of the high tones. In the former case, therefore, the vibrations had a more extensive sphere, and a greater arching upwards, so that, the affecting cord remaining motionless, the vibrating cord escaped contact with the growth.

I may again call to mind the restoration of the natural voice after the destruction, by chromic acid, of the superior portion of the tumour, a result only to be explained by the fact of the upward arching of the cords in phonic action.

In the production of the higher tones, on the other hand, the tension of the cords was greater, the glottis narrower, and the left cord came into intimate contact with the tumour, so that its vibratory power was completely annulled.

It should be remarked here that the tones of the voice, as thus restored from time to time during treatment, were of moderate force only, like those of the ordinary voice in speaking. In such tones it is acknowledged that the form of the glottis is slightly elliptical, and that its perfect closure need not and does not take place during vibratory action. In the powerful tones of the chest voice, on the contrary, the glottis is rectilinear in shape, and perfect momentary closure takes place.

With regard to the phenomena exhibited in the falsetto register, several interesting points may be mentioned.

It is universally acknowledged that in the production of this voice, only the thin edges of the cords are concerned, the vibrations being exceedingly minute. It is also pretty well agreed that the glottic aperture is wider in the production of the falsetto, than in the production of the full chest tones. There is not, however, a unity of opinion as to the relative length of the glottic aperture in the falsetto and in the chest registers.

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[1] Müller's experiments on the dead larynx show that it is possible for sound to be produced when one cord only vibrates, as in the case of unequal tension of the cords when a moderate force of the current of air is employed.

Without designing to enter upon the discussion of this mooted point, I desire to call to mind that, in this case, it is impossible that the glottis could have had a length greater than the distance from the posterior surface of the neoplasm to the vocal processes. The cartilaginous glottis was evidently closed, and, moreover, the sides of this portion of the glottic opening contain no vibrating element. Now, according to Mr. H.'s statement, his falsetto voice, before the affection of the larynx, was unusually deficient both in range and in musical quality. During the existence, however, of the morbid growth, I can bear witness to its good range and its good quality, the latter being quite noticeable. On the restoration of the natural voice, following the extirpation of the polyp, this quality of his falsetto was lost. Since the complete extirpation of the growth, also, the falsetto is inferior in all respects: but according to his own testimony, it is nearly, or quite as good as it ever had been.

Art. XIII.—*Case of Gunshot Wound of the Knee-Joint; Removal of the Ball from the Articulation; and Recovery.* By Walter F. Atlee, M. D., of Philadelphia.

John Devenny, aged eighteen years, residing in 24th Street, below Naudain, was shot by a pistol-ball in front of the left knee, on the 26th of October last. The pistol was fired from a distance of a few feet, and in a direction downwards. He walked immediately after the injury to his residence, a distance of about half a mile.

When I first saw him, at 2 o'clock, about two hours after the receipt of the wound, he was seated in a chair, the limb extended, and suffering intense pain in the articulation. He was placed in bed, the clothing removed, and the parts examined. The ball was found to have struck immediately below the centre of the lower edge of the patella; there was no wound of exit, and by a slight introduction of the probe I satisfied myself that the ball had entered and had passed beneath the ligament of the patella. The patient was put to bed, the wounded limb was kept as motionless as possible; water-dressings were applied over the knee, and morphia administered in large quantities. In the evening the joint was greatly swollen, the pain was increased, and the general symptoms were very severe.

The rule laid down by all authorities in such an injury, is never to seek to extract the ball unless it shows itself, so to speak, of its own accord. In this case, the severity and rapid development of the local and constitutional symptoms were such that it must terminate fatally, or at best, in the loss of the limb above the joint, by amputation, if they did not speedily subside. It was determined, therefore, provided they continued, to endea-